GE Medical Systems
Information Technologies

Addendum to Corometrics® 170 Series Service Manual Electromagnetic Compatibility (EMC) and Electrostatic Discharge (ESD)

Electromagnetic Compatibility (EMC)

Corometrics Model 171

Changes or modifications to this system not expressly approved by GE Medical Systems can cause EMC issues with this or other equipment. This system is designed and tested to comply with applicable regulation regarding EMC and must be installed and put into service according to the EMC information stated as follows.

WARNING
Use of portable phones or other radio frequency (RF) emitting equipment near the system may cause unexpected or adverse operation.

WARNING
The equipment or system should not be used adjacent to, or stacked with, other equipment. If adjacent or stacked use is necessary, the equipment or system should be tested to verify normal operation in the configuration in which it is being used.

Guidance and Manufacturer's Declaration – Electromagnetic Emissions

The Corometrics Antepartum Monitor, Model 171, is intended for use in the electromagnetic environment specified below. It is the responsibility of the customer or user to assure that the Corometrics Antepartum Monitor, Model 171, is used in such an environment.

Emissions Test	Compliance	Electromagnetic Environment – Guidance
RF Emissions EN 55011	Group 1	The equipment uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF Emissions EN 55011	Class B	The equipment is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic Emissions EN 61000-3-2	Not applicable	
Voltage Fluctuations/ Flicker Emissions EN 61000-3-3	Not applicable	

Guidance and Manufacturer's Declaration – Electromagnetic Immunity

The Corometrics Antepartum Monitor, Model 171 is intended for use in the electromagnetic environment specified below. It is the responsibility of the customer or user to assure that the Corometrics Antepartum Monitor, Model 171 is used in such an environment.

Immunity Test	EN 60601 Test Level	Compliance Level	Electromagnetic Environment – Guidance
Electrostatic Discharge (ESD) EN 61000-4-2	± 6 kV contact ± 8 kV air	± 6 kV contact ± 8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical Fast Transient/Burst EN 61000-4-4	± 2 kV for power supply lines ±1 kV for input/output lines	N/A	Mains power should be that of a typical commercial or hospital environment.
Surge EN 61000-4-5	± 1 kV differential mode ± 2 kV common mode	N/A	Mains power should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines EN 61000-4-11	<5% U_t (>95% dip in U_t) for 0.5 cycles <40% U_t (>60% dip in U_t) for 5 cycles <70% U_t (>30% dip in U_t) for 25 cycles <5% U_t (>95% dip in U_t) for 5 s	<5% U_t (>95% dip in U_t) for 0.5 cycles <40% U_t (>60% dip in U_t) for 5 cycles <70% U_t (>30% dip in U_t) for 25 cycles <5% U_t (>95% dip in U_t) for 5 s	Mains power should be that of a typical commercial or hospital environment. If the user of the Corometrics Antepartum Monitor, Model 171, requires continued operation during power mains interruptions, it is recommended that the host monitor be powered from an uninterruptible power supply.
Power Frequency (50/60 Hz) Magnetic Field EN 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

NOTE:

U_t is the AC mains voltage prior to application of the test level.

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Immunity Test	EN 60601 Test Level	Compliance Level	Electromagnetic Environment – Guidance
			Portable and mobile RF communications equipment should not be used closer to any part of the equipment, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance
Conducted RF EN 61000-4-6	3 Vrms 150 KHz to 80 MHz	3 V rms	$d = 1.2\sqrt{P}$
Radiated RF EN 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	$d = 1.2\sqrt{P}$ 80 MHz to 800 MHz $d = 2.3\sqrt{P}$ 800 MHz to 2.5 GHz where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer, and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey[a], should be less than the compliance level in each frequency range[b]. Interference may occur in the vicinity of equipment marked with the following symbol:

Note 1: At 80 MHz and 800 MHz, the higher frequency range applies.
Note 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by reflection from structures, objects, and people.

[a]Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radio, AM and FM radio broadcast, and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the equipment is used exceeds the applicable RF compliance level above, the equipment should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the equipment.

[b]Over the frequency range 150 KHz to 80 MHz, field strengths should be less than 3 V/m.

Recommended Separation Distances

The table below provides the recommended separation distances (in meters) between portable and mobile RF communication equipment and the Corometrics Antepartum Monitor, Model 171.The Corometrics Antepartum Monitor, Model 171, is intended for use in the electromagnetic environment on which radiated RF disturbances are controlled. The customer or the user of the Corometrics Antepartum Monitor, Model 171, can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the Corometrics Antepartum Monitor, Model 171, as recommended below, according to the maximum output power of the communications equipment.

	Separation Distance in Meters (m) According to Frequency of Transmitter		
Rated Maximum Output Power of Transmitter in Watts	150 kHz to 80 MHz [c] $d = 1.2\sqrt{P}$	80 MHz to 800 MHz [c] $d = 1.2\sqrt{P}$	800 MHz to 2.5 GHz [c] $d = 2.3\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

[c]At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

For transmitters rated at a maximum output power not listed above, the recommended separation distance [*d*] in meters (m) can be estimated using the equitation applicable to the frequency of the transmitter, where *P* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE:

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Compliant Cables and Accessories

WARNING
The use of accessories, transducers and cables other than those specified may result in increased emissions or decreased immunity performance of the equipment or system.

The table below lists cables, transducers, and other applicable accessories with which GE Medical Systems claims EMC compliance.

NOTE: Any supplied accessories that do not affect EMC compliance are not included.

Part No	Description	Maximum Lengths
Ultrasound Cables		
5700HAX	Nautilus Ultrasound Transducer Cable, loopstyle	2.4m / 8ft
5700JAX	Nautilus Ultrasound Transducer Cable, button-style	2.4m / 8ft
5700LAX	Nautilus Ultrasound Transducer Cable, button-style	3m / 10ft
5700MAX	Nautilus Ultrasound Transducer Cable, loop-style	3m / 10ft
TOCO Cables		
2264HAX	Nautilus Tocotransducer Cable, loop-style	2.4m / 8ft
2264JAX	Nautilus Tocotransducer Cable, button-style	2.4m / 8ft
2264LAX	Nautilus Tocotransducer Cable, button-style	3m / 10ft
2264MAX	Nautilus Tocotransducer Cable, loop-style	3m / 10ft
Remote Mark Cables		
0146AAY	Fetal Acoustic Stimulator	2.4m / 8ft
3919BAO	Remote Event Marker Cable	2.4m / 8ft
Telemetry Cable		
1563AAO	120/340 Interface Cable	3m / 10ft
Accessories		
2020760-001	NeST AC/DC Power Supply	N/A
600028	AC cord, Hospital grade, AHA	2.4m / 8ft
600034	AC cord, Hospital grade, IEC	2.4m / 8ft
600049	AC cord, Hospital grade, UK	2.4m / 8ft

Corometrics Model 172

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Emissions Test	Compliance	Electromagnetic Environment – Guidance
RF Emissions EN 55011	Group 1	The equipment uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
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Harmonic Emissions EN 61000-3-2	Not applicable	
Voltage Fluctuations/ Flicker Emissions EN 61000-3-3	Not applicable	

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Immunity Test	EN 60601 Test Level	Compliance Level	Electromagnetic Environment – Guidance
Electrostatic Discharge (ESD) EN 61000-4-2	± 6 kV contact ± 8 kV air	± 6 kV contact ± 8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical Fast Transient/Burst EN 61000-4-4	± 2 kV for power supply lines ±1 kV for input/output lines	N/A	Mains power should be that of a typical commercial or hospital environment.
Surge EN 61000-4-5	± 1 kV differential mode ± 2 kV common mode	N/A	Mains power should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines EN 61000-4-11	<5% U_t (>95% dip in U_t) for 0.5 cycles <40% U_t (>60% dip in U_t) for 5 cycles <70% U_t (>30% dip in U_t) for 25 cycles <5% U_t (>95% dip in U_t) for 5 s	<5% U_t (>95% dip in U_t) for 0.5 cycles <40% U_t (>60% dip in U_t) for 5 cycles <70% U_t (>30% dip in U_t) for 25 cycles <5% U_t (>95% dip in U_t) for 5 s	Mains power should be that of a typical commercial or hospital environment. If the user of the Corometrics Antepartum Monitor, Model 172, requires continued operation during power mains interruptions, it is recommended that the host monitor be powered from an uninterruptible power supply.
Power Frequency (50/60 Hz) Magnetic Field EN 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

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Radiated RF EN 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	$d = 1.2\sqrt{P}$ 80 MHz to 800 MHz $d = 2.3\sqrt{P}$ 800 MHz to 2.5 GHz where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer, and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey[a], should be less than the compliance level in each frequency range[b]. Interference may occur in the vicinity of equipment marked with the following symbol:

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[b]Over the frequency range 150 KHz to 80 MHz, field strengths should be less than 3 V/m.

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0.01	0.12	0.12	0.23
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5700HAX	Nautilus Ultrasound Transducer Cable, loopstyle	2.4m / 8ft
5700JAX	Nautilus Ultrasound Transducer Cable, button-style	2.4m / 8ft
5700LAX	Nautilus Ultrasound Transducer Cable, button-style	3m / 10ft
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Remote Mark Cables		
0146AAY	Fetal Acoustic Stimulator	2.4m / 8ft
3919BAO	Remote Event Marker Cable	2.4m / 8ft
Telemetry Cable		
1563AAO	120/340 Interface Cable	3m / 10ft
Accessories		
2020760-001	NeST AC/DC Power Supply	N/A
600028	AC cord, Hospital grade, AHA	2.4m / 8ft
600034	AC cord, Hospital grade, IEC	2.4m / 8ft
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Corometrics Model 173

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Emissions Test	Compliance	Electromagnetic Environment – Guidance
RF Emissions EN 55011	Group 1	The equipment uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
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Harmonic Emissions EN 61000-3-2	Not applicable	
Voltage Fluctuations/ Flicker Emissions EN 61000-3-3	Not applicable	

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Electrostatic Discharge (ESD) EN 61000-4-2	± 6 kV contact ± 8 kV air	± 6 kV contact ± 8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical Fast Transient/Burst EN 61000-4-4	± 2 kV for power supply lines ±1 kV for input/output lines	N/A	Mains power should be that of a typical commercial or hospital environment.
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Power Frequency (50/60 Hz) Magnetic Field EN 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

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Part No	Description	Maximum Lengths
FECG Cables		
1590AAO	Leg Plate Cable, Qwik Connect Plus®	2.4m / 8ft
1590CAO	Spiral Electrodes, Qwik Connect Plus®	N/A
Intrauterine Pressure Catheters		
2076BAO	Saflex® Intrauterine Pressure Catheter	N/A
1336AAO	Saflex® Intrauterine Pressure Catheters Cable	3.6m / 12 ft
1336BAO	Saflex® Intrauterine Pressure Catheters Cable	3.6m / 12 ft
1336EAO	Softrans Intrauterine Pressure Catheters Cable	3.6m / 12 ft
Ultrasound Cables		
5700HAX	Nautilus Ultrasound Transducer Cable, loopstyle	2.4m / 8ft
5700JAX	Nautilus Ultrasound Transducer Cable, button-style	2.4m / 8ft
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Part No	Description	Maximum Lengths
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Electrical Fast Transient/Burst EN 61000-4-4	± 2 kV for power supply lines ±1 kV for input/output lines	N/A	Mains power should be that of a typical commercial or hospital environment.
Surge EN 61000-4-5	± 1 kV differential mode ± 2 kV common mode	N/A	Mains power should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines EN 61000-4-11	<5% U_t (>95% dip in U_t) for 0.5 cycles <40% U_t (>60% dip in U_t) for 5 cycles <70% U_t (>30% dip in U_t) for 25 cycles <5% U_t (>95% dip in U_t) for 5 s	<5% U_t (>95% dip in U_t) for 0.5 cycles <40% U_t (>60% dip in U_t) for 5 cycles <70% U_t (>30% dip in U_t) for 25 cycles <5% U_t (>95% dip in U_t) for 5 s	Mains power should be that of a typical commercial or hospital environment. If the user of the Corometrics Intrapartum Monitor, Model 174, requires continued operation during power mains interruptions, it is recommended that the host monitor be powered from an uninterruptible power supply.
Power Frequency (50/60 Hz) Magnetic Field EN 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

NOTE:

U_t is the AC mains voltage prior to application of the test level.

Guidance and Manufacturer's Declaration – Electromagnetic Immunity

The Corometrics Intrapartum Monitor, Model 174, is intended for use in the electromagnetic environment specified below. It is the responsibility of the customer or user to assure that the Corometrics Intrapartum Monitor, Model 174, is used in such an environment.

Immunity Test	EN 60601 Test Level	Compliance Level	Electromagnetic Environment – Guidance
			Portable and mobile RF communications equipment should not be used closer to any part of the equipment, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance
Conducted RF EN 61000-4-6	3 Vrms 150 KHz to 80 MHz	3 V rms	$d = 1.2\sqrt{P}$
Radiated RF EN 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	$d = 1.2\sqrt{P}$ 80 MHz to 800 MHz $d = 2.3\sqrt{P}$ 800 MHz to 2.5 GHz where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer, and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey[a], should be less than the compliance level in each frequency range[b]. Interference may occur in the vicinity of equipment marked with the following symbol:

Note 1: At 80 MHz and 800 MHz, the higher frequency range applies.

Note 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by reflection from structures, objects, and people.

[a] Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radio, AM and FM radio broadcast, and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the equipment is used exceeds the applicable RF compliance level above, the equipment should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the equipment.

[b] Over the frequency range 150 KHz to 80 MHz, field strengths should be less than 3 V/m.

Recommended Separation Distances

The table below provides the recommended separation distances (in meters) between portable and mobile RF communication equipment and the Corometrics Intrapartum Monitor, Model 174.

The Corometrics Intrapartum Monitor, Model 174, is intended for use in the electromagnetic environment on which radiated RF disturbances are controlled. The customer or the user of the Corometrics Intrapartum Monitor, Model 174, can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the Corometrics Intrapartum Monitor, Model 174, as recommended below, according to the maximum output power of the communications equipment.

	Separation Distance in Meters (m) According to Frequency of Transmitter		
Rated Maximum Output Power of Transmitter in Watts	150 kHz to 80 MHz [c] $d = 1.2\sqrt{P}$	80 MHz to 800 MHz [c] $d = 1.2\sqrt{P}$	800 MHz to 2.5 GHz [c] $d = 2.3\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23
[c]At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.			

For transmitters rated at a maximum output power not listed above, the recommended separation distance [*d*] in meters (m) can be estimated using the equitation applicable to the frequency of the transmitter, where *P* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE:

These guidelines may not apply in all instances. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Compliant Cables and Accessories

WARNING
The use of accessories, transducers and cables other than those specified may result in increased emissions or decreased immunity performance of the equipment or system.

The table below lists cables, transducers, and other applicable accessories with which GE Medical Systems claims EMC compliance.

NOTE: Any supplied accessories that do not affect EMC compliance are not included.

Part No	Description	Maximum Lengths
FECG Cables		
1590AAO	Leg Plate Cable, Qwik Connect Plus®	2.4m / 8ft
1590CAO	Spiral Electrodes, Qwik Connect Plus®	N/A
Intrauterine Pressure Catheters		
2076BAO	Saflex® Intrauterine Pressure Catheter	N/A
1336AAO	Saflex® Intrauterine Pressure Catheters Cable	3.6m / 12 ft
1336BAO	Saflex® Intrauterine Pressure Catheters Cable	3.6m / 12 ft
1336EAO	Softrans Intrauterine Pressure Catheters Cable	3.6m / 12 ft
Ultrasound Cables		
5700HAX	Nautilus Ultrasound Transducer Cable, loopstyle	2.4m / 8ft
5700JAX	Nautilus Ultrasound Transducer Cable, button-style	2.4m / 8ft
5700LAX	Nautilus Ultrasound Transducer Cable, button-style	3m / 10ft
5700MAX	Nautilus Ultrasound Transducer Cable, loop-style	3m / 10ft
TOCO Cables		
2264HAX	Nautilus Tocotransducer Cable, loop-style	2.4m / 8ft
2264JAX	Nautilus Tocotransducer Cable, button-style	2.4m / 8ft
2264LAX	Nautilus Tocotransducer Cable, button-style	3m / 10ft
2264MAX	Nautilus Tocotransducer Cable, loop-style	3m / 10ft
Remote Mark Cables		
0146AAY	Fetal Acoustic Stimulator	2.4m / 8ft
3919BAO	Remote Event Marker Cable	2.4m / 8ft
Telemetry Cable		
1563AAO	120/340 Interface cable	3m / 10ft

Part No	Description	Maximum Lengths
Accessories		
2020760-001	NeST AC/DC Power Supply	N/A
600028	AC cord, Hospital grade, AHA	2.4m / 8ft
600034	AC cord, Hospital grade, IEC	2.4m / 8ft
600049	AC cord, Hospital grade, UK	2.4m / 8ft

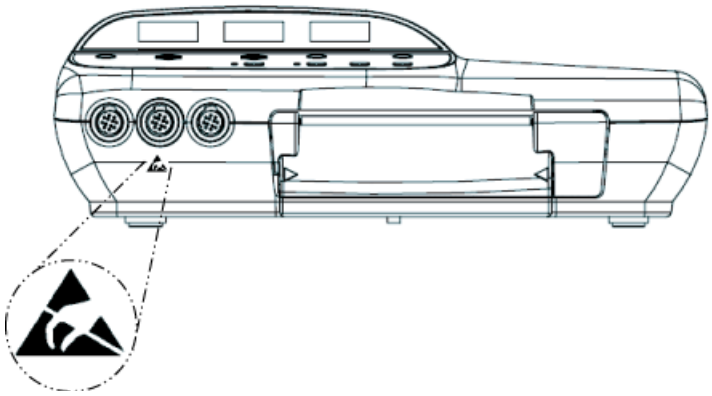
Electrostatic Discharge (ESD)

NOTE: The following ESD information applies only to the Corometrics Model 173 and Model 174 monitors.

Following is an updated list of symbols used on products manufactured by GE. This table appears in Chapter 1, page 1-7, of your Operator Manual. Some symbols may not appear on your unit.

Equipment Symbols	
	ATTENTION: Consult accompanying documents.
	TYPE B EQUIPMENT. Type B equipment is suitable for intentional external and internal application to the patient, excluding direct cardiac application.
	TYPE BF EQUIPMENT. Type BF equipment is suitable for intentional external and internal application to the patient, excluding direct cardiac application. Type BF equipment has an F-type applied part.
	ALTERNATING CURRENT (AC).
	EQUIPOTENTIALITY.
	ON/STANDBY: button toggles between full power and standby.
	ELECTROSTATIC DISCHARGE (ESD): ■ All potential users should receive an explanation of the ESD warning symbol and training in ESD precautionary procedures. ■ The minimum content of an ESD precautionary procedure training should include an introduction to the physics of electrostatic charge, the voltage levels that can occur in normal practice and the damage that can be done to electronic components if they are touched by an operator who is electrostatically charged. Further, an explanation should be given of methods to prevent build-up of electrostatic charge, and how and why to discharge one's body to earth or to the frame of the equipment.

NOTE: The Electrostatic Discharge symbol appears beneath the ECG receptacle. See "Placement of ESD Symbol on Monitor" on page 25.



Placement of ESD Symbol on Monitor

Revision History

Each page of the document has the document part number and revision letter at the bottom of the page. The revision letter changes each time the document is updated.

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Revision	Date	Comment
A	September 14, 2004	Initial Release

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0459

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